Pollution in textbooks from 16 countries: Socio-economic and ethical issues; Individual or social responsibility?

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Abstract

In this study it was intended to analyse the progression of the socio-economic and ethical dimensions within the topic pollution, in the textbooks of 16 countries, along their school system, by looking at the *Socio-economic and Ethical Dimensions* as well as at the *Approaches to solve pollution problems*, within the conception *Individual vs social*.
In this work we analysed textbooks from sixteen countries from Europe (West to East: Portugal, France, Italy, Malta, Germany, Hungary, Poland, Romania, Lithuania, Estonia, Finland, Cyprus), from Africa (Senegal, Morocco, Tunisia) and from the Middle East (Lebanon), since the first grade till the end of the secondary school. We used a grid constructed in the context of a European Project "Biohead Citizen" ("Biology Health and Environmental education for better citizenship" STREP, CIT2-CT2004-506015, Carvalho et al. 2004).
About socio-economical end ethical issues, results showed that: i) these dimensions are completely absent in the textbooks of 6 of the 16 analysed countries; ii) among the countries where both dimension are present (predominantly in the Western European countries), the *Socio-economic* dimension is consistently more present than the *Ethical* one. Concerning the *Approaches to solve pollution problems*, countries that highlight changes in technologies in detriment of changes in individual behaviour are also the same ones that give more attention to socio-economic and ethical controversies.

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1. Introduction

The didactical transposition analysis makes it possible to understand why certain scientific contents are or are not taught (external didactic transposition – EDT) and, when they are on the programmes, how they are taught (internal didactic transposition – IDT) (Clément, 2006). In this perspective, textbook analysis is a major element in the evaluation of how the educational goals (at normative level of the national programmes) are implemented at school level.

Ethics is the study of the appreciation judgements that concern the human conduct and it is this discernment that leads to the understanding of what is socially correct to the actual generation, and, in a long term, what is sustainable (Mata & Cavalcanti (2002). According to Gomes (2006), environmental education must be present at all levels and modalities of teaching, because environment preservation depends upon an ecological awareness, and this construction depends upon education, more specifically upon environmental education, so that: *"this* [the education] *is the most effective preventive way of environment protection"* Freitas (2002:66 – referred by Gomes (2006).

In this study we analysed the progression of the socio-economic and ethical dimensions within the topic pollution, in the textbooks of 16 countries, along their school system, by looking at the *Socio-economic and Ethical Dimensions*. Within this, it was made a comparative analysis of the number of occurrences of the *socio-economic* dimension with the frequency of the *ethical* dimension along the different countries textbooks. We also analysed the *Approaches to solve pollution problems*, within the conception *Individual vs social* associated to the topic of Pollution in textbooks of 16 countries involved in European project FP6 Biohead-Citizen. Special attention was given to the progression since the first school year to the end of the secondary studies in these countries.

2. Methodology

The corpus of this study was composed of 79 textbooks of Chemistry, Biology, Natural Sciences, Geology and Ecology of 16 countries (22 from Lebanon, 11 from France, 10 from Portugal, 9 from Italy, 5 from Hungary, 4 from Tunis, 3 from Germany, 3 from Morocco, 2 from Cyprus, 2 from Estonia, 2 from Lithuania, 2 from Malta, 1 from Finland, 1 from Poland, 1 from Romania, and 1 from Senegal), since the 1st year (5/6 years old) until the last year of school, before university (17/18 years old). The grids in Ecology and Environmental Education were conceived in the European Project FP6 STREP Biohead-Citizen (CIT2-CT2004-506015), but for this study only the theme pollution was used and within it we looked at the *Socio-economic and Ethical Dimensions*. Within this, it was made a comparative analysis of the number of occurrences of the *socio-economic* dimension with the frequency of the *ethical* dimension along the different countries textbooks. We also analysed the *Approaches to solve pollution problems*, within the conception *Individual vs social*.

3. Results

3.1. The *socio-economic and ethical* dimensions

Results presented in Table 1 show that: i) the socio-economic and ethical controversies are completely absent in 6 of the 16 analysed countries (Cyprus, Lebanon, Lithuania, Morocco, Poland, Romania); ii) in the textbooks of those countries were, at least, one of the dimensions is present, the socio-economic dimension is consistently more important than the ethical one, with the exception of Finland, with two ethical controversies, and none socio-economic controversy. One of the ethical controversies in this country refers to the human population overgrown:

"The population/amount of human beings of the Earth grows. Every new citizen increases the use of resources and the amount of emissions. The recourses on the biosphere cannot offer the same occidental level of consumption to all citizens. Though, it is morally difficult to deny people in the developing countries not to improve their low standard of living. Is it time to take a look at environmental questions universally and in a new way?"

Table 1: Socio-economic and ethical occurrences in textbooks of 16 countries

Country	Analysed Textbooks (n)	Socio-economic dimension frequency	Ethic dimension frequency	Occurrences by textbook (n)	
				Socio-economic dimension	Ethical dimension
Malta	2	6	2	3.0	1.0
Tunisia	4	9	4	2.3	1.0
Senegal	1	2	0	2.0	0
Germany	3	4	1	1.3	0.3
France	11	12	2	1.1	0.2
Estonia	2	2	2	1.0	1.0
Hungary	5	5	2	1.0	0.4
Italy	9	8	2	0.9	0.2
Portugal	10	5	1	0.5	0.1
Finland	1	0	2	0	2.0
Cyprus	2	0	0	0	0
Lebanon	22	0	0	0	0
Lithuania	2	0	0	0	0
Morocco	3	0	0	0	0
Poland	1	0	0	0	0
Romania	1	0	0	0	0
Total	**79**	**53**	**18**	**---**	**---**
Average	**---**	**---**	**---**	**0.7**	**0.2**

In the 16 analysed textbooks, it was recorded an average of 0.7 occurrences per textbook about the socio-economic dimension whereas only an average of 0.2 about ethical issues (Table 1). This means that discussions around socio-economic issues are more than three times frequent than those that concern ethical problems.

Looking more carefully at the results it becomes clear that in general the controversies are more present in European western countries. Indeed, it was noticed that the textbooks of Malta, Germany, France, Italy, Portugal, and Finland contribute, all together, with 35 of the 53 occurrences of the socio-economic debate, and with 10 of the 18 ethical controversies verified in the total of the 16 countries. Apparently, this seems to indicate that more democratized countries are, also, the most opened to self-questioning, to debate and controversy. In this way, textbooks are a reflect of the socio-political reality, becoming visible the differences between systems of values.

3.2. The approaches to solve pollution problems: Individual *vs* social responsability:

As it can be seen on Table 2, there is an high belief in technologies – as a way to cope with pollution problems – consistently more present in the Western European countries: 7.5 occurrences in Portugal, 7.0 occurrences per textbook regarding this indicator in Finland, 4.3 in Germany, and 3,5 occurrences in Cyprus. These results show some correlation between the development of a given country and its belief that science and technology will solve the pollution issues.

About the indicator *Changes in individual behaviour*, there isn't any interpretative regularity in the data regarding the presence of this indicator. In fact, countries with different socio-economic, cultural and political realities have approximate average values: 2.0 occurrences per textbook in Finland, 1.5 in Estonia, and 1.5 in Portugal. The same irregularity was found regarding the indicator *changes in interaction between individual and social behaviour*. Finally, and in contrast, the average number of occurrences related to the indicator *changes in social behaviour*, is stronger in developed countries such as Portugal, Italy, Finland

and France (with 1.8, 1.0, 1.0, and 0.9, average occurrences per textbook respectively, all of them rating above the 0.7 global average).

Table 2: Frequencies of four indicators within "Approaches to solve pollution problems" in textbooks of 16 countries.

Country	N Analysed Textbooks	Changes in individual behaviour	Changes in social behaviour	Changes in interaction between individual and social behaviour	Changes in technologies	Nº of occurrences by textbook			
						Changes in individual behaviour	Changes in social behaviour	Changes in interaction between individual and social behaviour	Changes in technologies
Portugal	10	15	18	5	75	1.5	1.8	0,5	7.5
Finland	1	2	1	1	7	2.0	1.0	1.0	7.0
Germany	3	3	2	3	13	1	0.7	1.0	4.3
Cyprus	2	1	1	2	7	0.5	0.5	1.0	3.5
Italy	9	3	9	3	21	0.3	1.0	0.3	2.3
Lebanon	22	26	11	5	47	1.2	0.5	0.2	2.1
Malta	2	0	0	0	4	0	0	0	2.0
Senegal	1	0	0	0	2	0	0	0	2.0
Estónia	2	3	2	1	3	1.5	1.0	0.5	1.5
Poland	1	1	1	1	1	1.0	1.0	1.0	1.0
Romania	1	1	0	0	1	1.0	0	0	1.0
France	11	5	10	6	9	0.5	0.9	0.5	0.8
Tunísia	4	3	2	2	2	0.8	0.5	0.5	0.5
Hungary	5	1	2	0	0	0.2	0.4	0	0
Morocco	3	2	0	0	0	0.7	0	0	0
Lithuania	2	0	0	0	0	0	0	0	0
Total	**79**	**66**	**59**	**29**	**192**	---	---	---	---
Average	---	---	---	---		0.8	0.7	0.4	2.2

4. Discussion

In the analysed textbooks, there is a significant preponderance of socio-economic controversies by comparison with ethical ones. France and Tunis textbooks are those with a major number of socio-economic occurrences.

Nowadays, debates of socio-economic nature seem to work within dichotomies that do not challenge the logic of the *modus operandi* of the mainstream social and economic system. As an example, one can read in a Portuguese textbook: "*the contrast in distribution of production and consumption of energetic resources, especially oil, arises economic problems."* Such controversies in their essence do not challenge the expectations that the individual already has in face of himself and the society, nor challenge the more mainstream values, where is highlighted the importance that is given to the economic growing, consumption, competitively, etc.

In contrast, debates around ethical issues seem very often to be understood as uncontrollable by educational agents (O'Toole, 2002) since they create conflicts between such incompatible value systems, that could be demanded the abandon of a certain "way of life" as means to find a real solution to such conflicts. For example, we can say that "to use the car is more comfortable and less laborious than walking", as we also can say that "using the car pollutes and contributes to the green house effect, which, in the limit, can contribute to put at stake the existence of life in the planet". This creates an ethical dilemma with a difficult resolution to take between the nowadays individual comfort and the collective welfare of the future generations. When speaking about environment, ethics is an essential foundation for the human behaviour. Decisions about natural resources management must be taken into account, to the present and to the successors generations. (Mata e Cavalcanti, 2002).

The explicit presence of such controversies is a real challenge and it invites the individuals to assume a reflexive position that, in a final analysis, can lead to a breakthrough with the social order by questioning even the authority figures themselves. The ethical debate seems to be in a secondary place. An improvement of knowledge around this questions is not enough to lead to changes, but it is, no doubt, an important factor, since it leads to the increase

of the scientific literacy (Carvalho, 2002) giving the introspection that can lead to the fall of the values usually considered unchangeable (O'Toole, 2002).

At the same time, there seems to be a strong belief expressed in the European western countries textbooks that technology will solve by itself the pollution problems. So, there may be two major negative consequences regarding this fact as: a) pupils may put more hope in technology advances as a way to solve pollution issues than in the changes of their own individual behaviour; b) the almost unlimited faith in technology and science as the new saviours of the planet may ruin the very existence of ethical debates around the pollution themes. As a matter of fact, science is regarded as a morally neutral tool, which may throw the pollution issues to a non-ethical ground. So, the perception that individual changes may lead to global solutions may be threatened and, at the same time, the controversies generated inside the pollution debates may be emptied from its moral connotations.

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